REMARKS

Rejections Under 35 U.S.C. § 102

Claims 1-3, 9, 18-20, and 22-27 were rejected as anticipated by Kendall, U.S. Patent No. 3,881,244. On page 1 of the office action the Examiner states the reasoning for these rejections.

> Kendall discloses: a substrate comprising a semiconductor having a crystalline structure comprising germanium [col 9, lines 20-25]; a magnetic core 12 formed on said substrate [figure 13]; a plurality of paths 9 extending through the substrate; conductive coil 17 wove through said plurality of paths and surrounding said magnetic core, wherein conductive coil is at least partially diffused into said crystalline structure [figures 13, 14a, 14b, col 7, lines 63-66 and col 8, lines 40-45].

Applicants respectfully traverse the rejection. The Examiner has not addressed all of the positively recited limitations of the claims individually, and particularly has failed to note all the features of the dependent claims. Particularly, Kendall does not address the limitation of "depositing a first conductive material" when "forming a magnetic core" as recited in independent Claim 1. The magnetic core as claimed in the present application is not disclosed in Kendall. Additionally, the Examiner has included limitations that are irrelevant to the claims of the present application, such as the reference to "conductive coil is at least partially diffused into said crystalline structure." As a result, irrespective of the amendments contained herein, Applicants submit that the Examiner's anticipation rejections are overcome.

Nevertheless, to facilitate prosecution and gain quick allowance of the present case, Applicants have amended Claim 1 to specify "depositing a first metallic material into the vias." Claim 27 has been amended to recite "a plurality of vias filled with metallic material." Kendall does not disclose the use of metallic posts with a magnetic core. In fact, Kendall does not disclose the use of magnetic core, rather it simply discloses the use of a metallic core, such as an iron-based core. (Col. 5, lines 11-14).

Several embodiments of Kendall use a core formed from the substrate. The embodiments illustrated in figures 14A, 14B, and 17 use non-metallic cores. In figures 14A and 14B, the "substrate material 2 is utilized as the core material for the solid state inductor." (Col. 6, lines 30-31). In figure 17, the core is substrate, with circuit components formed within. (Col. 9, lines 28-30).

When a non-substrate core is used, such as the metallic core in figure 6 of Kendall, silicon posts are used. For example, in the embodiment illustrated in figures 1-9, the pillars are etched from the substrate. (Figures 3-5 and col 3, lines 38-62.) In the embodiment seen in figures 10-12, the posts are formed by epitaxial growth. "[S]emiconductor studs are epitaxially grown to the 20 mil height of the surface." (Col. 6, lines 7-8).

Independent Claims 1 and 27 now recite the use of a magnetic core with metallic posts. Kendall does not recite these features, so each and every claim limitation of the independent claims are not met. Thus, Applicant now submits that the anticipation rejections have been overcome and the claims are in condition for allowance. Furthermore, the dependent claims cited as anticipated by Kendall, Claims 2-3, 9, 18-20, and 22-26, add further distinguishing features of particular utility. Accordingly, Applicants submit that the dependent claims are also allowable over the Kendall reference.

Rejections Under 35 U.S.C. § 103

The Examiner rejected Claims 4-5, 8, 11, 13-14, and 21 as obvious over Kendall. These claims all depend upon independent Claim 1, and add further distinguishing features of particular utility. As Kendall does not disclose the use of "metallic material in the vias" in combination with a magnetic core, the independent claim is in condition for allowance. Thus, these dependent claims are also in condition for allowance.

Examiner rejected Claims 6-7 and 28-30 as being unpatentable over Kendall in view of Ahn, A Fully Integrated Planar Toroidal Inductor with a Micro-machined Nickel Iron Magnetic Bar, *IEEE Transactions On Components, Packaging, and Manufacturing Technology*. Applicant respectfully traverses these rejections as Ahn does not remedy the deficiencies in Kendall.

Ahn discloses a planar, toroidal inductor over, but not within, a substrate. The inductor of Ahn is fabricated over a silicon wafer substrate, rather than within a substrate. (Figures 7a-7f and accompanying text) The vias and the cavity for the magnetic core are formed within a polyimide insulator layer formed over the substrate. "Polyimide (PI-2611) was multi-spincoated and cured to construct a cavity 40 μm in depth to contain a magnetic core bar." (Page 466, second column, first full paragraph) "Via holes are then dry etched through the polyimide layer." (Page 466, second column, last paragraph).

While figures 7a - 7f and the accompanying text of the Ahn reference do disclose the use of a silicon wafer, they do not disclose "forming a plurality of vias in a substrate...[and]...depositing a first metallic material into the vias to form a plurality of metallic posts[.]" (Claim 1). By forming the inductor within the substrate, integration into an integrated circuit is improved.

The combination of references do not teach "a magnetic core formed within the substrate..[and] a plurality of vias filled with a metallic material providing a plurality of metallic posts through the substrate." The Examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness.

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references combined) must teach or suggest all the claim limitations.

M.P.E.P. § 2142 (emphasis added).

Because this burden is not carried, Applicants submit that the rejections of Claims 6-7 and 28-30 are overcome and the claims are now in condition for allowance.

Examiner rejected Claim 10 as unpatentable under 35 U.S.C. 103(a) over Kendall in view of Charles (U.S. Patent No. 5,062,197). Charles does not disclose inductors formed within substrates, rather it merely discloses the use of magnetic core structures for high frequency inductors. Thus, the Charles reference does not remedy the deficiencies of the Kendall reference. Charles does not teach "depositing a first metallic material into the vias to form a plurality of conductive posts" because the inductors are not formed within a substrate. Thus, Applicant submits that Claim 10 is in condition for allowance.

Examiner rejected Claims 12 and 31 as obvious over Kendall in view of Kurtz et al (U.S. Patent No. 5,569,626). However, Kurtz merely discloses the formation of a porous region in an unrelated context. No adequate suggestion to combine is presented. Examiner states that the

motivation to combine would be to "reflect the light back through the transparent layer where it can be detected by a light detection system." (Office action page 5) While this might be useful for piezo-optical pressure sensitive switches, the feature of transparency is not of immediate benefit to one of skill in the art that they would combine these two references. Neither the Kendall reference nor any other cited reference provide the motivation to combine Kurtz with Kendall to form a transparent layer. In fact, the porous region in the present Application is filled with a metal oxide. (Claim 12) Once the metal oxide is deposited, the porous region would no longer be transparent. Thus, the references of record provide no suggestion to combine.

Additionally, because Kurtz does not teach anything related to inductors, it does not remedy the deficiencies of Kendall. As discussed above, Applicant believes the independent claims are in condition for allowance. Claims 12 and 31 add features of particular utility and should thus also be in condition for allowance.

Finally, Examiner rejects claims 15 – 17 as being obvious over Kendall in view of Hubbard (U.S. Patent No. 5,227,659). Like the Ahn reference above, the inductor disclosed in Hubbard is formed on the substrate (figure 1). Additionally, Hubbard does not teach "forming a plurality of vias in a substrate" and "depositing a first metallic material into the vias to form a plurality of metallic posts". The coil and core in Hubbard are formed over the substrate in an oxide insulating layer.

The Hubbard reference teaches the use of metallic coils surrounding an inductor's magnetic core. However, the Examiner provides no suggestion to combine the inductor formed in oxide over the substrate with the inductor of Kendall formed within the substrate. One of ordinary skill in the art would not combine the two references because the Hubbard reference is a "volcano" style inductor formed outside of the substrate, while Kendall is formed within the substrate using vertical posts.

In view of the foregoing, Applicants respectfully submit that Claim 1 and Claim 27, as amended, are in condition for allowance. Furthermore, dependent Claims 2-26 include all the features and limitations of independent Claim 1 in addition to further distinguishing features of particular utility. Dependent Claims 28-29, and 31-32 include all the features and limitations of independent Claim 27 in addition to further distinguishing features of particular utility.

Accordingly, Applicants respectfully submit that Claims 1-29 and 31-32 are in condition for allowance.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance and request the same. If, however, some issue remains that the Examiner feels can be addressed by Examiner Amendment, the Examiner is cordially invited to call the undersigned for authorization.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.

Respectfully submitted,

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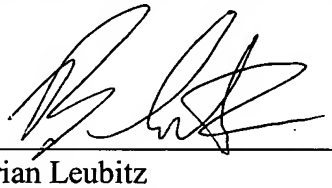
Dated: 9/8/04

By: 

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